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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/618,282

07/09/2003

Martin Sorrells

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02/09/2006

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EXAMINER

HINZE, LEO T

ART UNIT

PAPER NUMBER

2854

DATE MAILED: 02/09/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/618,282	<b>Applicant(s)</b> SORRELLS ET AL.	
	<b>Examiner</b> Leo T. Hinze	<b>Art Unit</b> 2854	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 15 November 2005.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 11-14 and 22-35 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 23-35 is/are allowed.
- 6) ☒ Claim(s) 11-14 and 22 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

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## DETAILED ACTION

### *Election/Restrictions*

1. Applicant's election without traverse of Group II, claims 11-14 and 22-25 in the reply filed on 11 July 2005 is acknowledged.

### *Claim Rejections - 35 USC § 102*

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 11 and 13 are rejected under 35 U.S.C. 102(b) as being anticipated by Driscoll et al., US 5,250,871 (Driscoll).
  - a. Regarding claim 11, Driscoll teaches a quad compensated clock for use in a borehole system, said quad compensated clock comprising: (a) a quad compensated resonator comprising four oscillator crystals (10, Fig. 2); (i) electrically connected in series ("connected in series", col. 3, ll. 43-44) with their acceleration sensitivity vectors aligned (see alignment of 15, 20 and 25, Fig. 2), nominally one per quadrant, in a common plane, and (ii) configured in pairs so that maximum acceleration sensitivity vectors of oscillators comprising said pairs are in opposite directions ("each have two crystallographic axes that are in antiparallel relationship with each other", col. 3, ll. 17-18); and (b) oscillator circuitry cooperating with said quad compensated

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resonator (45, Fig. 3); wherein (c) outputs of said oscillator crystals in said quad compensated resonator are combined and input to said oscillator circuitry to form a quad compensated clock output with reduced sensitivity to acceleration (“acceleration sensitivity vector... is substantially reduced”, col. 3, ll. 39-41); and (d) during a predetermined time interval, said quad compensated clock output is capable of being combined with output from a quad compensated temperature sensor using a compensation algorithm resident in a processor cooperating with said clock, to correct said quad compensated clock output for variations in crystal properties. The examiner considers the limitation contained in (d) to be an intended use that does not create any additional structural limitation on the quad compensated clock, and further, that both a quad compensated temperature sensor and a processor cooperating with said clock do not appear to be positively claimed.

b. Regarding claim 13, Driscoll teaches that said crystal properties comprise crystal aging, crystal hysteresis, crystal warm-up, and crystal short-term and long-term frequency stability, because the properties of crystal aging, crystal hysteresis, crystal warm-up, and crystal short-term and long-term frequency stability are inherent properties of oscillator crystals.

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a

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person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Driscoll in view of applicant's admission.

Driscoll teaches all that is discussed in the rejection of claims 11 and 32 above, except wherein said quad compensated resonator comprises oscillator crystals having a temperature stability of about  $\pm 20$  parts per million over a temperature range of about 0 to 180 degrees Centigrade. Driscoll is silent as to the specific operating characteristics required for each oscillator.

Applicant's admission teaches using known oscillators from Quartzdyne, Inc. (p. 9, l. 22) having the properties of temperature stability of about  $\pm 20$  parts per million over a temperature range of about 0 to 180 degrees Centigrade.

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify Driscoll to select oscillators with temperature stability of about  $\pm 20$  parts per million over a temperature range of about 0 to 180 degrees Centigrade, because a person having ordinary skill in the art would recognize that selecting known oscillator crystals with the desired operating characteristics for a particular application would be a matter of design choice.

6. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Driscoll in view of Cecconi et al., US 20020060952 A1 (Cecconi).

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Driscoll teaches all that is claimed as discussed in the rejection of claims 11 and 32 above, including packaging (55, Fig. 3) for said quad compensated resonator and said cooperating oscillator circuitry.

Driscoll does not teach wherein said packaging comprises insulation to reduce sharp temperature fluctuations and thermal transient effects in said quad compensated resonator and said cooperating oscillator circuitry.

Cecconi teaches a device and method for seismic drill hole measuring, including an underground clock device (23, Fig. 5) with a quartz crystal (p. 3, ¶ 40) and thermal insulation (p. 3, ¶ 40). Such thermal insulation is advantageous in helping the clock survive the operating conditions at the bottom of a drill hole (p. 1, ¶ 3).

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify Driscoll to add insulation to reduce sharp temperature fluctuations and thermal transient effects in said quad compensated resonator and said cooperating oscillator circuitry as taught by Cecconi, because Cecconi teaches that thermal insulation is advantageous in helping the clock survive the operating conditions at the bottom of a drill hole.

7. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Driscoll in view of Brauer, US 4,633,422.

Driscoll teaches a method for measuring time from within a borehole system, the method comprising; (a) providing a quad compensated clock, the said quad compensated clock comprising four oscillator crystals (10, Fig. 2); (b) configuring said oscillator crystals in each said quad compensated clock to a sensitivity vector of each said oscillator crystal to form a quad

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compensated resonator (see alignment of 15, 20 and 25, Fig. 2); (c) combining outputs of said oscillator crystals in said quad compensated resonator to form a quad compensated clock output (“connected in series”, col. 3, ll. 43-44); and (c) selecting said configuration and said combination of outputs of said oscillator crystals to reduce effects of acceleration (“acceleration sensitivity vector... is substantially reduced”, col. 3, ll. 39-41) upon said quad compensated clock output.

Driscoll does not teach providing an ensemble of quad compensated clocks, or using a compensation algorithm resident in a processor cooperating with said quad compensated resonator, correcting said quad compensated clock output for changes in response properties of said crystals.

It has been held that mere duplication of parts is not sufficient to patentably distinguish an invention over the prior art. See MPEP § 2144.44 (VI)(B).

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to use as many of the devices of Driscoll as required, as a person having ordinary skill in the art would recognize that using more than one device could provide more outputs that could be advantageously used to provide more data and subsequently perform more and varied analysis of a drilling operation.

Brauer teaches an apparatus and method of compensating for variations due to aging, including a compensation algorithm resident in a processor for correcting oscillator output for changes in response properties of oscillator crystals (col. 10, ll. 38-44). Brauer teaches that this is a new and improved method and apparatus for compensating for aging variations of

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electromechanical resonators that utilizes extremely low power consuming components which contribute to a highly accurate and stable output of an oscillator including the resonator (col. 2, ll. 31-36).

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify Driscoll to include in the circuitry a compensation algorithm resident in a processor for correcting oscillator output for changes in response properties of oscillator crystals, because Bauer teaches that such an algorithm is a new and improved method and apparatus for compensating for aging variations of electromechanical resonators that utilizes extremely low power consuming components which contribute to a highly accurate and stable output of an oscillator including the resonator.

### *Response to Arguments*

8. Applicant's arguments with respect to claims 11-14 have been fully considered but they are not persuasive.

a. Regarding applicant's argument that Driscoll does not teach the subject matter of amended claim 11, the examiner has set forth how Driscoll does teach the subject matter of amended claim 11 in the rejection of claim 11 above. The examiner considers the newly added limitation contained in (d) to be an intended use that does not create any additional structural limitation on the quad compensated clock, and further, that both a quad compensated temperature sensor and a processor cooperating with said clock do not appear to be positively claimed.



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- b. Regarding applicant's argument that Driscoll does not teach the subject matter of claim 12, the arguments are moot in light of the new ground of rejection of claim 11.
  - c. Regarding applicant's argument that Driscoll does not teach the subject matter of amended claim 13, the arguments are moot in light of the new ground of rejection.
  - d. Regarding applicant's argument with respect to claim 14: applicant admits on p. 11 that Cecconi teaches thermal insulation. Because claim 14 is an apparatus, claim, differences in how the combination of Driscoll and Cecconi may operate are immaterial if the combination contains all of the structural limitations and functionality of the claimed subject matter. The combination of Driscoll and Cecconi contains all of the structure and functionality claimed as discussed in the rejection of claim 14 above.
9. Applicant's arguments with respect to claim 22 have been considered but are moot in view of the new ground(s) of rejection.

*Allowable Subject Matter*

10. Claims 23-35 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

*Conclusion*

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

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12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leo T. Hinze whose telephone number is (571) 272-2167. The examiner can normally be reached on M-F 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Andrew Hirshfeld can be reached on (571) 272-2168. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Leo T. Hinze  
Patent Examiner  
AU 2854  
2 February 2006



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